(12) UK Patent Application (19) GB (11) 2 159 007 A

(43) Application published 20 Nov 1985

(21) Application No 8505736

(22) Date of filing 6 Mar 1985

(30) Priority data

(31) 8407276 (32) 21 Mar 1984 (33) GB

(51) INT CL[4]
H01R 9/09

(52) Domestic classification
H2E 163 EKA
U1S 2087 H2E

(56) Documents cited
US 3998513

(58) Field of search
H2E

(71) Applicants
The Plessey Company plc
(United Kingdom)
Vicarage Lane, Ilford, Essex

(72) Inventor
Colin Sydney Osborne

(74) Agent and/or Address for Service
R. Nicholson, The Plessey Company plc, Intellectual Property Department, Vicarage Lane, Ilford, Essex

(54) Anisotropic connectors for connecting printed circuit boards

(57) An electrical connector 10 comprises a body consisting of a number of thin layers of resilient insulating material 14 separated by thin layers of conductive resilient material 12 to form conductive paths through the connector body. The conductive medium embodied in the layers of conductive material is carbon fibre. A triangular connector 36 is formed likewise. The resilient material is a silicon polymer.

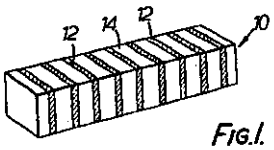

FIG.1.

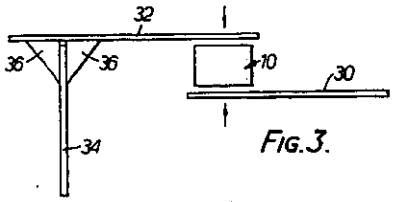

FIG.3.

GB 2 159 007 A

1/1

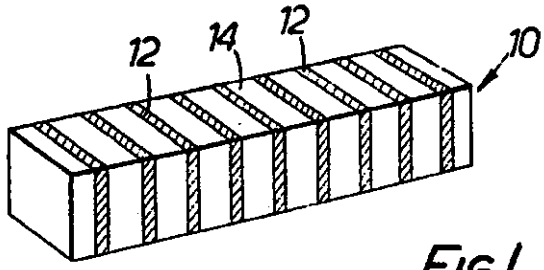

FIG.1.

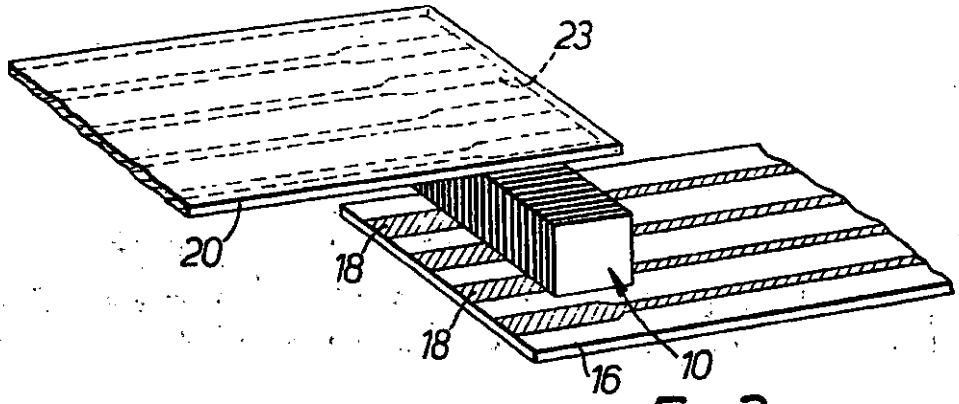

FIG.2.

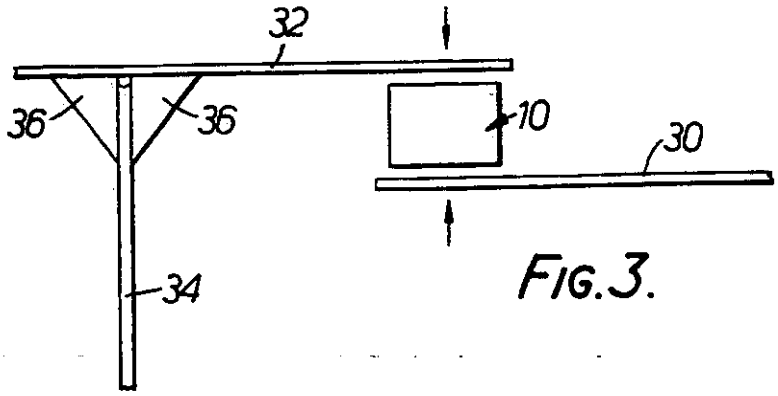

FIG.3.

SPECIFICATION

Improvements in electrical connectors

This invention relates to electrical connectors suitable for forming insulated conductive paths between two components each having a plurality of electrical contacts formed thereon. Examples of such components are printed circuit boards having rows of conductors terminating along the edges of the boards.

It is an object of the present invention to provide an electrical connector which should be significantly cheaper than known mechanical type connectors and which will not require accurate positioning to form electrical connections with the electrical contacts.

According to the present invention an electrical connector comprises a body comprising at least two layers of insulating resilient material separated by a lamella of conductive material so as to form a conductive path through the body, the lamella comprising a resilient material containing a plurality of carbon fibres.

Preferably the resilient material comprises a silicon elastomer such as a silicon polymer. The carbon fibres may consist of chopped strands or bunches arranged in a random manner in the conductive lamella or may be in the form of a woven or knitted mat so that the lamella is conductive on any direction. Alternatively the carbon fibres may be arranged in a disciplined manner so that the conductive lamella is only conductive between two or more edges of the lamella. The carbon fibres may be individually plated with a metal, such as copper to improve their conductivity.

Preferably there are provided a plurality of conductive lamellae separated by a plurality of insulating layers, the conductive lamellae having a very fine pitch, e.g. of the order of 0.1mm.

Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a perspective view of an electrical connector according to the invention;

Figure 2 is a perspective view of the electrical connector of Figure 1 used between two conductor carrying substrates; and,

Figure 3 is a view of a number of electrical connectors positioned between several printed circuit boards.

The electrical connector 10 shown in Figure 1 comprises a plurality of thin layers 12 of silicon elastomer, each having a filling of carbon fibres, separated by thin layers 14 of unfilled silicon elastomer, the filled and unfilled layers being bonded together. The connector can be sliced into thinner portions or cut to particular shapes to suit various applications. The silicon elastomer can be a silicon polymer. The carbon fibre filling consists of random chopped strands, bunches or a woven or knitted mat or any other suitable arrangements so that the filled layers can be conductive in any direction. Alternatively the carbon fibres may be arranged in a disciplined manner so that the filled layers are only conductive between two or more edges of the layers. The fibres can be individually plated with a metal, such as copper, to improve conductivity if required.

A typical pitch of the conductive layers 12 could be of the order 0.1mm enabling a substrate 16 with spaced conductors 18 having a pitch of, for example, 2mm to be connected to another substrate 20 with conductors 23 on its underside. The conductors 18 and 23 are of similar pitch and the connector 10 is located between the substrates 16 and 20 as shown in Figure 2. Since the pitch of the conductive layers 12 is so much finer than the pitch of the conductors 18 and 23, opposing conductors will be connected by around 20 conductive layers 12 without the need for the connector 10 to be accurately positioned relative to the substrates 16 and 20. The resilience of the connector 10 also enables gas-tight joints to be formed between the substrates and the connector 10.

Figure 3 illustrates a number of connectors 10 and 36 arranged between three printed circuit boards 30, 32 and 34. The boards 30 and 32 are similar to the substrates 16 and 20 of Figure 2, with the board 32 having conductors on its underside which are connected to conductors on the upperside of board 30 by the conductive layers 12.

The board 34 is perpendicular to the board 32 and has conductors (not shown) on both sides. The conductors on the underside of the board 32 are connected to the conductors on the board 34 by connectors 36 having a triangular cross-section. These also serve to support the board 34 whilst permitting a degree of relative movement between the boards 32 and 34 without the electrical connections being broken.

It will be seen that the electrical connector can be cut or moulded to many cross-sectional shapes depending on the application, such as polygonal, circular, annular, eliptical, etc.

CLAIMS

1. An electrical connector comprising a body comprising at least two layers of insulating resilient material separated by a lamella of conductive material so as to form a conductive path through the body, the lamella comprising a resilient material containing a plurality of carbon fibres.

2. An electrical connector as claimed in claim 1 in which the resilient material comprises a silicon elastomer.

3. An electrical connector as claimed in claims 1 or 2 in which the carbon fibres consist of chopped strands or bunches arranged in a random manner in the conductive lamella.

4. An electrical connector as claimed in claims 1 or 2 in which the carbon fibres are in the form of a woven or knitted mat.

5. An electrical connector as claimed in claims 1 or 2 in which the carbon fibres are arranged in a disciplined manner in the conductive lamella so that the conductive lamella is only conductive between two or more edges of the lamella.

6. An electrical connector as claimed in any preceding claim in which the carbon fibres are

individually plated with a metal to improve their conductivity.

7. An electrical connector constructed as hereinbefore described with reference to the accompanying drawings.

Printed in the United Kingdom for Her Majesty's Stationery Office, 8818935, 11/85, 18996. Published at the Patent Office, 25 Southampton Buildings, London WC2A 1AY, from which copies may be obtained.